

Some idea of the scope of the observations may be found from the following list of the tables contained in the bulletin:

#### RECORDS FROM RIO DE JANEIRO, 1914.

1. Daily rainfall (with diagram).
2. Hourly rainfall
3. Hourly mean rainfall by months.
4. Comparison of the monthly rainfall of 1914 with the average for 34 years observation.
5. Monthly rainfall, and rainfall days, 1881-1914.
6. Monthly insolation.
7. Hourly insolation.
8. Variations from hour to hour by months of temperature, vapor tension, relative humidity, and wind velocity.
9. Frequency by months of certain amounts of temperature change from hour to hour, and from day to day.
10. The same for relative humidity.
11. A summary of the last three tables for the year 1914.
12. Correlation of the wind directions with certain other observations.
13. Table of monthly rainfall, evaporation, and insolation for 1914.
14. General table of all observations for 1914.

These tables are followed by the less detailed observations for the same year from 59 regular stations, and by the rainfall data from 32 rainfall stations.—*P. E. J.*

#### THE GREEN RAY.

By Dr. M. E. MULDER.

Doctor Mulder deserves our thanks for assembling and publishing so many observations and discussions of the "green ray," or "green flash," as the sudden turning to green of the last starlike tip of the sun, as it sets behind a distant, clear, and cloudless horizon, is called—an interesting phenomenon, and very common, especially over water. I myself have seen it many times, both on land and at sea, always as an objective reality, never as a mere after-image.

When the sun sets in a clear sky, its last rays obviously leave the observer in the order of their refrangibility, that is, red first, then the orange, yellow, green and blue. Evidently, therefore, the color of the last tip of the setting sun is green, or even bluish green, for about a second, when the air is exceptionally clean, and red when the lower atmosphere is so laden with dust as to transmit but little light of the shorter wave lengths.

Although an adequate description and complete explanation of the "green ray" can be given in a few lines, Doctor Mulder's book, somewhat evenly divided between English, French, and German, is pleasant reading. It

also has the merit of preserving several references to blue and green suns, unusual phenomena for which no generally-accepted explanation has yet been offered.—*W. J. H.*

#### IS THE ATMOSPHERE WARMED BY CONVECTION FROM THE EARTH'S SURFACE? <sup>1</sup>

By W. SCHMIDT.

[Reprinted from *Science Abstracts*, Section A, § 1512, p. 542.]

By convection is here understood the combined effect of pure thermal convection caused by warming of the lowest layers by contact with a heated surface and also mixing of dynamical origin arising out of the passage of air over the earth's rough surface. Evidence is produced to show that when the latter is present mixing is in general much more effective and the flux of heat greater than when the former alone is active. The direction of the flux of heat depends on whether the actual temperature gradient exceeds or falls short of the adiabatic, and by consideration of the average observed lapse of temperature in different regions, and including in the high layers latent heat carried up by water vapor and liberated when condensation occurs, the author draws the conclusion that, contrary to the usual view, except for a comparatively narrow equatorial zone, the average flux of heat by convection over most of the globe is toward the earth's surface, which in this respect exercises a cooling action. But the lower atmosphere may be warmed on the average by long-wave radiation emitted by the earth.—*M. A. G.*

<sup>1</sup> *Meteorologische Zeitschrift*, September, 1921, 38, 262-268.

#### SUNSPOT IN HIGH LATITUDE.

[Reprinted from *Nature*, London, September 23, 1922, p. 428.]

A small sunspot was noted at Mount Wilson, Calif., on June 24, 1922, in latitude 31° N., longitude 8° E. No spot has been seen in such a high latitude since December, 1919, and it is considered to be the first spot of the new cycle. It will be remembered that the equatorial spots of the expiring cycle continue for a year or more after the commencement of the new one, so that the actual minimum may not be reached till next year. The above spot was of negative polarity, whereas most of the single northern spots in the expiring cycle were positive. This is a further argument, though not a decisive one, for the spot belonging to the new cycle.

#### BIBLIOGRAPHY.

##### RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN. Meteorologist in Charge of Library.

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

##### Apia. Samoa Observatorium.

Resultate der meteorologischen Beobachtungen am Samoa-Observatorium von 1916 bis 1919. p. 218-220. 30 cm. (Repr. Meteorologische Zeitschrift. H. 7. 1922.)

##### Austria. Zentralanstalt für Meteorologie und Geodynamik.

Allgemeiner Bericht und Chronik der in den Jahren 1916-1921 in Österreich beobachteten Erdbeben. Mit einem Nachtrag über die in Niederösterreich in den Jahren 1914 und 1915 beobachteten Erdbeben. Wien. 1922. 40 p. chart. 23 cm. (Amtliche Veröffentlichung. No. 13.)

##### Bemporad, A.

Nuova formulazione della teoria dell' assorbimento selettivo dell' atmosfera e nuove esperienze in proposito. Napoli. 1917. 7 p. 24 cm. (Extr.: Rend. della R. accad. delle scienze fisiche e matematiche di Napoli. Ser. 3a. v. 23. 1917.) (R. Osserv. astron. di Capodimonte. Contributi astronomici. No. 15.)

##### Bemporad, A., & others.

Osservazioni pireliometriche eseguite a Capodimonte nell'anno 1914. Napoli. 1921. 61 p. illus. 34 cm. (Memorie del R. Osserv. di Capodimonte in Napoli. No. 6.)

##### Briggs, Glen.

Vegetable growing in Guam. Washington. 1922. ii. 60 p. plates. 23½ cm. (Guam agric. exper. sta. Bulletin no. 2.) ["Climate." p. 3.]

##### Bunge, Bernh.

Der Registrierapparat für Sondier-Gummiballone nach Asmann und Anleitung zur Prüfung desselben. Berlin. n. d. 4 p. plate. 27 cm.